tunity for development, and an ardent love for nature gave truthful direction to his taste. In 1878 appeared in an unexpected quarter a little treatise upon the "Ferns of Kentucky," which surprised all fern lovers by the beauty and novel form of its illustrations. These were etchings by Mr. Williamson's own hand, transferred to the lithographic stone. This was soon after followed by the publication of a work illustrating the ferns of the region covered by Gray's Manual. In this work the plates were printed directly from the etchings, and the book appeared under the modest title of "Fern Etchings." This work not only supplied a real want in the world of science, but surprised and delighted all lovers of the art he was so successfully cultivating, and the best art-critics were loud in encomium. Encouraged by this, he was giving himself to the fuller cultivation of his powers in that direction, when his health failed, and he was taken away at the outset of a career which gave such promise of brilliancy, leaving behind him a widowed mother, to whom he had manifested a tender filial devotion. His friend Mr. Davenport has done justice to the sterling excellencies of his character in a touching sketch in a recent number of the *Botanical Gazette*.

J. H. R.

Botanical Notes.

The May-flower.—It has been suggested that the delicate and modest little flower which we call the May-flower should be adopted as the emblem of the loyalists, because it is in full bloom at the season of the year when they landed on these rocky shores. In connection with this it may not be out of place to inquire as to the use of the word May-flower or "May-blossom" in the past; and especially to ask what was the *May-flower of the loyalists?* Was their May-flower identical with our spring favorite, or was it some other plant, to us unknown, or if known, called by some other name.

Our May-flower has been named by botanists *Epigæa repens* or the plant that *creeps on the ground*—a name very appropriate to its habit of grow, thas it forms patches of foliage. . . . It belongs to the great family of the heaths, and its nearest allies in this country are the bear-berry, spicy wintergreen and tea-berry. They, like the May-flower have evergreen leaves, and differ in this respect from most of the American heaths.

But the purpose of these remarks is not so much to describe the May-flower and its habits as to inquire whether this flower of ours was the May-flower of the loyalists. The writer was very much surprised many years ago, on being told by an old lady who came here with the loyalists, that our plant (*Epigæa repens*) was *not* the May-flower. Among the wild flowers that were afterwards shown to her she at once recognized one as the true May-flower. This was the plant which is now called the spring beauty (*Claytonia Caroliniana*), a delicate little plant with two opposite leaves, which are not unlike an Indian's canoe-paddle in shape, and having a cluster of nodding pink flowers between the leaves. The short stem which the spring beauty annually sends up comes from a little brown tuber buried deep in the rich mould of the hardwood forest. The plant differs

from *our* May-flower in preferring a rich and moist soil, and its stem is soft and succulent like that of its ally the purslane (*Portulaca*), while the stem of *our* May-flower is strong and woody, and its leaves are thick and hard.

The family to which the lady belonged, who spoke of the spring beauty as the true May-flower, came from Connecticut; and it is easy to see why our May-flower was not theirs. In the region where they had lived before removing to St. John, the *Epigæa* would blossom in April, and the term "May-flower" would be inappropriate to it; hence some other blossom with them would have borne the name of "May-flower." The name and the associations connected with it were dear to those New England colonists; with what object more attractive could they have associated the ideas and the name than the delicate spring beauty—a plant which abounds in the rich woods covering the mountains and hills of Western New England and New York. To the loyalists of Connecticut, therefore, the word "May-flower" carried a different meaning from that which it bears with us.

And to the loyalists of New York and New Jersey, where the *Epigæa* was known as the trailing arbutus, the idea of "May-flower," as applied to this plant, was equally foreign. Their name for our May-flower, however, was not happily chosen, as the arbutus was one of those European heath plants which casts its leaves in the autumn, and in this resembles such American heath-plants as the leather-leaf (*Cassandra*) and the Lambkill (*Rhodora*). These cover the "barrens" with foliage and flower in June and July, but are bare and brown in the winter. As the term "trailing arbutus" was used in the Middle States for the *Epigæa* within a short time after the loyalists left there, it was probably current in their time as well. Whether the spring beauty was their May-flower or not, it is sufficiently clear that the *Epigæa* was not.

But to go one step further back in the history of the "May-flower." Washington Irving, in his "Knickerbocker's History of New York," describes in a very amusing way the helplessness of the Dutch Governors of New York in their attempt to oppose the colonizing tendencies of the New Englander. He describes the encroachment of the Yankees upon the territory of their Dutch neighbors on the northern shore of Long Island Sound, and they even swarmed over into Long Island, displacing the Dutch or occupying the country in advance of them. These Puritan farmers carried with them the tradition that their ancestors came over from England in the "May-flower." Many of them settled in Connecticut, and their descendants formed the bulk of the emigrants from that State whom we know under the name of loyalists. It is quite clear, however, that the May-flower for which the ship of the Pilgrim Fathers was named was not the "May-flower" of the loyalists, any more than the plant so designated by the latter is the May-flower of the maritime Canadians, for neither the *Epigæa repens* nor the spring beauty were known to Europeans before the discovery of America. They are both natives of this continent and are unknown in the old. The May-flower of the Pilgrims must, therefore, have been some other plant—perhaps the hawthorn (*Cratægus Oxycantha*), which appears to be alluded to by Mickle in the following lines:—

" By this stream and the *May blossomed* thorn
That first heard his love tale and his vows."

And by Spencer in the following:

" To gather *May busket* and smelling brere
And home they haste the postes to dight."

And in Chaucer there is the following line:

"And fresher than the *May* with flowers newe."

The hawthorn still bears in England the name of " The May," and there can be little doubt that its fragrant blossoms suggested the name borne by the pioneer ship of the Plymouth colony.

As the location of the Sacred Mount—the point of dispersion of a primitive people—was transferred to the migrating Indo-European nations from one country to another, in the Old World, so the Saxon emigrants transferred the name of " May-flower " to a new species of plant, as they lost their familiarity with the old. To us, living in a region where *Epigæa* abounds, and blossoms in May, it very appropriately bears the name of May-flower, not only on account of its beauty and its fragrant flowers, but because it blooms in the spring. It is rightly chosen by the descendants of the loyalists as a fitting emblem of those who, on this day 100 years ago, first set foot on the shores of New Brunswick. Its home is in that region of the North American continent which extends from the Atlantic coast of Nova Scotia, through New Brunswick and Maine, to Eastern Ontario, Lake Superior and the rocky wilds of the northwest. In Ontario and the Maritime Provinces of Canada is the home of the loyalists, and when the first detachment of these people landed on the rocky shores of St. John's harbor in the spring of 1783, there can be no doubt that they found the May-flower (*Epigæa*) blooming around them. In its leaves, fresh and green from beneath the winter snow, they would have seen an emblem of their own preservation through adversity in the past, and in its modest and fragrant blossom an omen of content and prosperity in the future.

In conclusion, it may be added that our reflections upon the May-flower lead to the following result:—

The May-flower of the Pilgrims was not the May-flower of all the loyalists.

The May-flower of the loyalists was not the May-flower of the maritime Canadians.

The May-flower of certain of the loyalists was the spring beauty.

The May-flower of the maritime Canadians may very fittingly be dedicated to the loyalists.

Or, to consider the matter from a chronological standpoint, it may be said that 260 years ago the hawthorn was the May-flower. One hundred years ago the spring beauty was to some loyalists the May-flower. *Now* the *Epigæa* is to the descendants of the loyalists the May-flower.—*G. E. Mather, in Canadian Sci. Monthly.*

The Continuity of Protoplasm in plants is still attracting considerable attention in botanical circles. An interesting article in *Nature* (June 16, p. 182) gives a *resumé* of the history of the subject from the year 1837. Herr Russow, who maintains that in all plants during their entire life the whole of the protoplasm is continuous, says the protoplasmic threads are seen well in *Rhamnus*, *Fraxi-*

nus, Humulus, Gentiana cruciata and in the bark of *Prunus, Quercus,* etc. Threads, however, which contain no granules, but are transparent and homogeneous, are with difficulty rendered visible. His method of examination is to lay the sections to be examined in a solution of 0.2 per cent. of iodine and 1.64 per cent. of potassium iodide in concentrated sulphuric acid. After removal, the sections are repeatedly washed and then stained with aniline blue; in some cases they are previously stained with picric acid. Mr. Gardiner, however, considers that the sulphuric acid method is unsatisfactory and that the method of swelling with chloro-iodide of zinc and of staining with picric-Hoffman blue is in every way more advantageous, since little alteration of structure takes place and the staining with blue is limited to the protoplasm.

Chemical Constituents of Plants—Herr M. Ballo contributes an important paper on this subject to the Proceedings of the German Chemical Society. He thinks that oxalic acid has a much more important function in vegetable physiology than is generally supposed, carbohydrates being formed from the reduction of this and other vegetable acids rather than by direct synthesis from carbonic acid and water. Tartaric acid, on the other hand, is a product either of the oxidation of carbohydrates or of the reduction of oxalic acid, as is also the glycolic acid which occurs in unripe grapes and in the the leaves of the wild vine. As regards all other products of oxidation, the less the amount of oxidation the more complicated is the product and the more closely related to the original substance; while, when oxidation is carried on further, we get the original substances by which the plant is nourished. The vegetable acids are the most common products of oxidation in the plant. A portion of the oxalic acid is used in the decomposition of calcium sulphate, the rest as the raw material for the production of glycolic, tartaric, malic and succinic acids.

If formic acid is heated with nitric acid it is oxidized into carbonic acid and water, the nitric acid being reduced to nitrous oxide; but at the commencement of the process oxalic acid is formed, and the author believes that this process also takes place in nature, and that this is one of the reasons why nitrates are so valuable to the growing plant. In the living plant a portion of the nitrates is used in the production of ammonia and other substances nearly related to it, and another in the conversion of amide compounds into alcohol compounds. The greater part is reduced to the state of nitrous oxide, and from this nitric acid is again formed through the agency of oxygen and water. Hence a small quantity of nitrates can bring about the formation of a large quantity of oxalates.

Electric currents exist without doubt in the living plant, and it is possible that in some cases these may be converted into chemical work consisting in the decomposition not merely of water but also of salts. The products of decomposition of these salts may cause the formation of metal derivatives at the negative pole, of derivatives with negative radicals at the positive pole. Elsewhere, these substances may again combine with one another and the same process be then again repeated. Hence the comparatively small quantity of inorganic salts found in plants.